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WETLAND IMPACT ASSESSMENT FOR THE PROPOSED TOWNSHIP ON FARMS HAAKDOORNBOOM 267 JR AND KRUISFONTEIN 259 JR, WITHIN CITY OF TSHWANE METROPOLITAN MUNICIPALITY IN GAUTENG PROVINCE

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30/03/2020

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DOCUMENT CONTROL

REPORT NAME	MOLEPO, M. 2020. WETLAND IMPACT ASSESSMENT FOR THE PROPOSED TOWNSHIP ON FARMS HAAKDOORNBOOM 267 JR AND KRUISFONTEIN 259 JR, WITHIN CITY OF TSHWANE METROPOLITAN MUNICIPALITY IN GAUTENG PROVINCE	
REFERENCE	WET-NSS0330	
SUBMITTED TO	Nali Sustainability Solutions (Pty) Ltd	
AUTHORS	MOKGATLA MOLEPO *PR. NAT. SCI* (009509)	

EXECUTIVE SUMMARY

MATAVHA Environmental (Pty) Ltd was appointed by Nali Sustainability Solutions (Pty) Ltd to conduct a wetland impact assessment for the proposed township on Farms Haakdoornboom 267 JR and Kruisfontein 259 JR near Soshanguve within the City of Tshwane Metropolitan Municipality, Gauteng. According to National Freshwater Ecosystem Priority Areas (NFEPA), there are several wetlands within the study area. However, ground truthing revealed that there is one prominent wetland located south west of the study area two drainage lines that traverse the area. Due to the proposed development being an urban settlement, buffers of 30 and 32 m will apply for wetland and drainage lines respectively.

These drainage lines, ponds and wetlands play a crucial role for migratory species. As a result, these watercourses, wetlands and ponds warrant protection.

This wetland assessment report is intended to provide detailed information on the aquatic constraints, potential impacts and recommended mitigation measures for the proposed township development.

The Risk Assessment for the proposed project as per the General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as defined in Section 21 (c) and (i) (Notice 509 of 2016) was undertaken. In terms of Section 39 of the NWA, likelihood of wetland being impacted by the proposed township development and its activities is very low.

In line with the above, the risk of the proposed activities resulting in any degradation of the aquatic ecosystems in the study area is low. Development should be prohibited from the areas within the delineated boundaries and should be undertaken in areas outside of the 30 m buffer zone delineated for this township project.

With strict adherence to the recommendations and mitigation measures, the proposed township development will therefore not result in the net loss of functional wetlands within the catchment, and it is the recommendation of the specialist that this proposed project be favourably considered.

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LIST OF TERMS AND ABBREVIATIONS

Delineation – the technique of establishing the boundary of an aquatic resource such as a wetland or riparian area.

Drain – In the context of wetlands, refers to a natural or artificial feature such as a ditch or trench created for the purpose of removing surface and sub-surface water from an area (commonly used in agriculture).

Ecological Importance – An expression of the importance of an environmental resource for the maintenance of biological diversity and ecological functioning on local and wider scales.

Ecological Sensitivity – A system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.

EIS – Ecological Importance & Sensitivity.

GIS – Geographical Information Systems.

GPS – Global Positioning System.

HGM – Hydro-Geomorphic.

NFEPA – National Freshwater Ecosystem Priority Areas, identified to meet national freshwater conservation targets (CSIR, 2010).

PES – Present Ecological State, referring to the current state or condition of an environmental resource in terms of its characteristics and reflecting change from its reference condition.

DECLARATION OF INDEPENDENCE

I, Mokgatla Molepo, in my capacity as a specialist consultant, hereby declare that I:

- Act/acted as an independent specialist to Nali Sustainability Solutions (Pty) Ltd for this project.
- Do not have any personal, business, or financial interest in the project expect for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2017.
- Will not be affected by the outcome of the environmental process, of which this report forms part of.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments but aim to present facts and my best scientific and professional opinion with regard to the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2017.

INDEMNITY

- This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data related to the site to be affected, *in situ* fieldwork, surveys and assessments and the specialists best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions and recommendations given in this report are based on the specialist's best scientific and professional knowledge as well as information available at the time of study.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations and conclusions at any stage should additional information become available.
- Information and recommendations in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgement of these terms and liabilities.

Mokgatla Molepo *Pr. Nat. Sci.* (009509)

30 March 2020

1. INTRODUCTION

Wetlands are defined as those areas that have water on the surface or within the root zone for long periods during the year to allow for the development of anaerobic conditions. In terms of Section 1 of the National Water Act (NWA, Act 36 of 1998), wetlands are legally defined as: (1) land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Whereas, RAMSAR Convention defines wetland as: (1.1) areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.

And (2.1) may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands.

Wetlands are created from anaerobic conditions formed by unique soil conditions (i.e. hydric soils) and support vegetation (i.e. hydrophytes) that are adapted to these conditions. The hydric soils develop a grey or sometimes greenish or blue-grey colour as a result of the chemical reduction of iron (i.e. gleying). The hydric soils that are seasonally flooded are characterized by the formation of mottles, which are relatively insoluble, enabling them to remain in the soil long after it has been drained.

As a result, it is possible to identify wetland areas on the basis of soil colour using a standard colour chart such as Munsell Soil Colour Chart, 1994 to determine matrix hue and chroma levels. The mottle hue and chroma initially increase and then decrease the more saturated the soils are which helps to ascertain if the area is a wetland or not and the period of saturation.

Typically, indicators of soil wetness based on soil morphology correspond closely with vegetation distribution, since hydrology affects soils and vegetation in systematic and predictable ways. In systems where the hydrological regime has been modified due to human activities, vegetation distribution will vary systematically with soil morphology. The response of vegetation to alteration of hydrological conditions is rapid (i.e. months/years), whereas the response of soil morphology to such alteration is slow (i.e. centuries). Therefore, lowering of the water table or reduction of surface flows, may lead to rapid establishment of non-wetland related terrestrial vegetation, whereas the soil morphology will retain indicators of wetness for a lengthy period.

Soil morphology forms the basis of wetland delineation nationally, mainly because it provides a long-term indication of the “natural” hydrological regime. However, soil

morphology cannot be considered to necessarily reflect the current hydrological conditions of the site where the hydrological regime has been altered, and in such circumstances, vegetation provides the best indication of the distribution of wetlands as it best reflects current hydrological conditions.

MATAVHA Environmental (Pty) Ltd was appointed by Nali Sustainability Solutions (Pty) Ltd to conduct a wetland impact assessment for the proposed township on Farms Haakdoornboom 267 JR and Krusifontein 259 JR within City of Tshwane Metropolitan Municipality, Gauteng Province.

A site visit was undertaken on the 20th of March 2020 by a professional team. According to National Freshwater Ecosystem Priority Areas (NFEPA), the proposed site has several wetlands and ground truthing was necessary to verify and delineate the wetlands.

This wetland assessment report is intended to provide detailed information on the aquatic constraints, potential impacts and recommended mitigation measures for the proposed project.

1.1. PROJECT LOCATION

The proposed project area is located north of Pretoria City (Figure 1). The site was accessed via R80 and Hebron Road. Farms Haakdoornboom 267 JR and Krusifontein 259 JR were considered for the proposed township.

The following are the central coordinates of the site:

25°34'33.00"S, 28°08'10.00"E

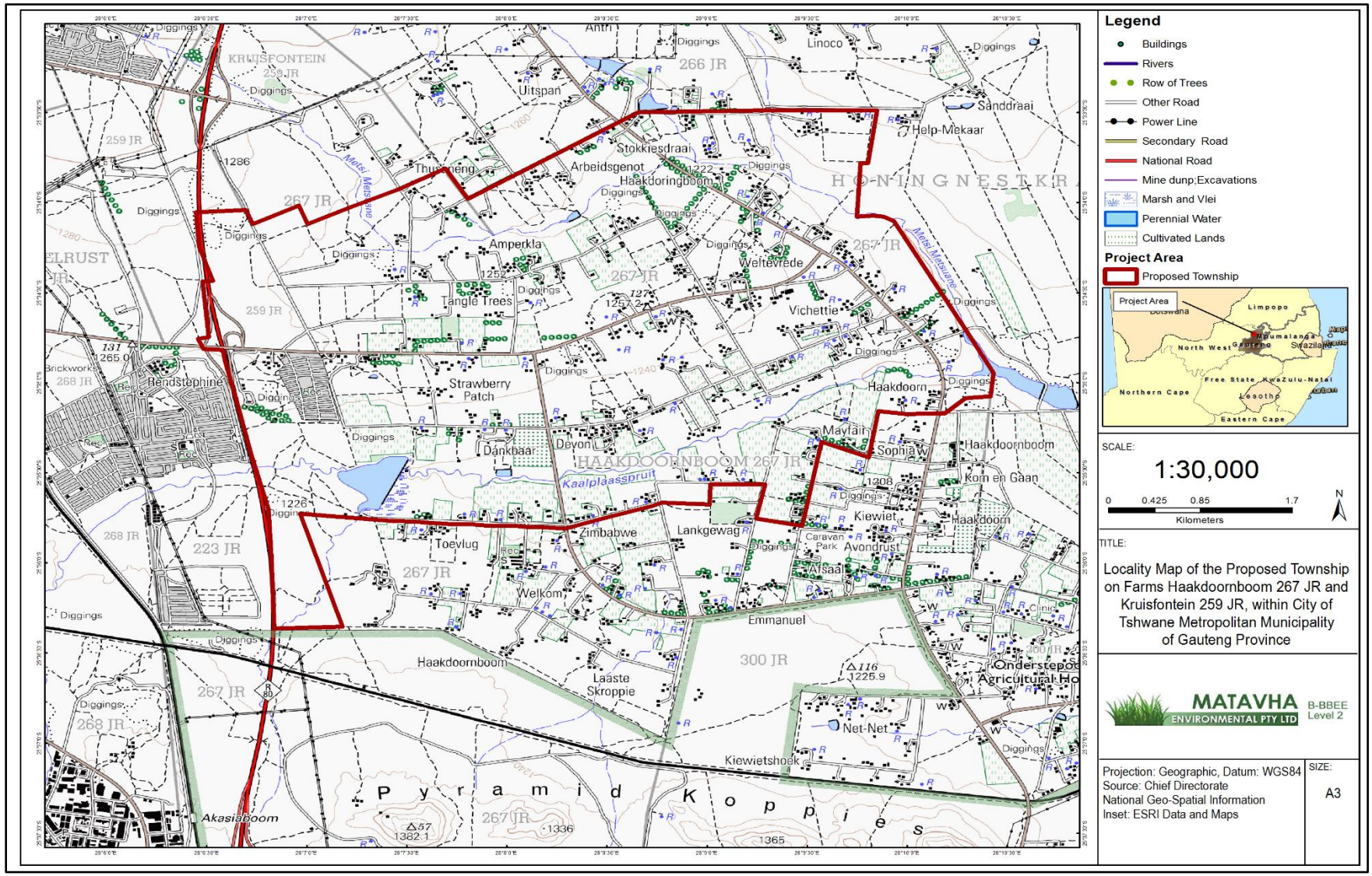

Figure 1: Locality map of the project area.

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Desktop assessment of the project site (identify wetlands within the site by examining existing national and provincial wetland databases, 1: 50 000 topographical maps, and ortho/ aerial photographs, if available).
- Identify riparian areas where they occur;
- A site visit to confirm the presence or absence of wetland areas within the proposed project site area as well as verify wetland boundaries;
- Identify, assess, and delineate any waterbodies/wetlands within the study area;
- Assessment of the Present Ecological Status of wetlands on site (Level 1, WetHealth);
- Assessment of Ecological Importance and Sensitivity of wetlands on site; and
- Impact assessment of the proposed activities on the wetlands;
- Apply buffers to the outer edges of the wetlands within the site;
- Assess impacts of the proposed township development on the identified wetlands and suggest mitigation measures for minimising potential impacts on wetlands; and to
- Compile report with maps.

3. ASSUMPTION AND LIMITATIONS

The following assumptions and limitations are applicable to this report:

- Other areas that were identified on a desktop level, could not be verified on site due to established informal settlements. Conducting work on these areas would have been invasion of privacy;
- The wetland assessment is confined to the proposed township footprint and does not include the neighbouring properties, which were only considered as part of the desktop assessment;
- The wetland delineation as presented in this report is regarded as a best estimate of the wetland boundary based on the site conditions present at the time of assessment. Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur.

4. METHODOLOGY

Input into this report was informed by a combination of desktop assessments of existing aquatic ecosystem information for the study area and catchment, as well as by a more

detailed assessment of the aquatic features on the site. The site was visited in February 2020. During the field visit, the characterization and integrity assessments of the aquatic features and the site were undertaken. The SANBI Biodiversity GIS website was also consulted to identify any constraints in terms of fine-scale biodiversity conservation mapping as well as possible aquatic features mapped in the Freshwater Ecosystem Priority Areas maps.

The project area will be developed into an urban area. Following Macfarlane and Bredin (2017) Buffer guideline, a buffer of 30 m for wetland and 32 m for drainage/watercourse will apply for this proposed development.

The level of this assessment conducted was considered to be adequate for this project. This assessment was undertaken as a requirement in terms of National Environmental Management Act 107 of 1998 which manages and conserves natural resources; thus monitors and assess their sustainable use and compliance and the Environmental Impact Assessment Regulations of 2017 which indicates the listed activities that pose environmental threats anticipated during proposed development in order to attain sustainable environmental management and economic development prior to authorization.

4.1. WETLAND DEFINITION AND DELINEATION TECHNIQUE

For the purpose of this assessment, wetlands are considered as those ecosystems defined by the National Water Act as:

> "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

These habitats are found where the topography and geological parameters impede the flow of water through the catchment, resulting in the soil profiles of these habitats becoming temporarily, seasonally, or permanently wet. Further to this, wetlands occur in areas where groundwater discharges to the surface forming seeps and springs. Soil wetness and vegetation indicators change as the gradient of wetness changes (Fig. 2).

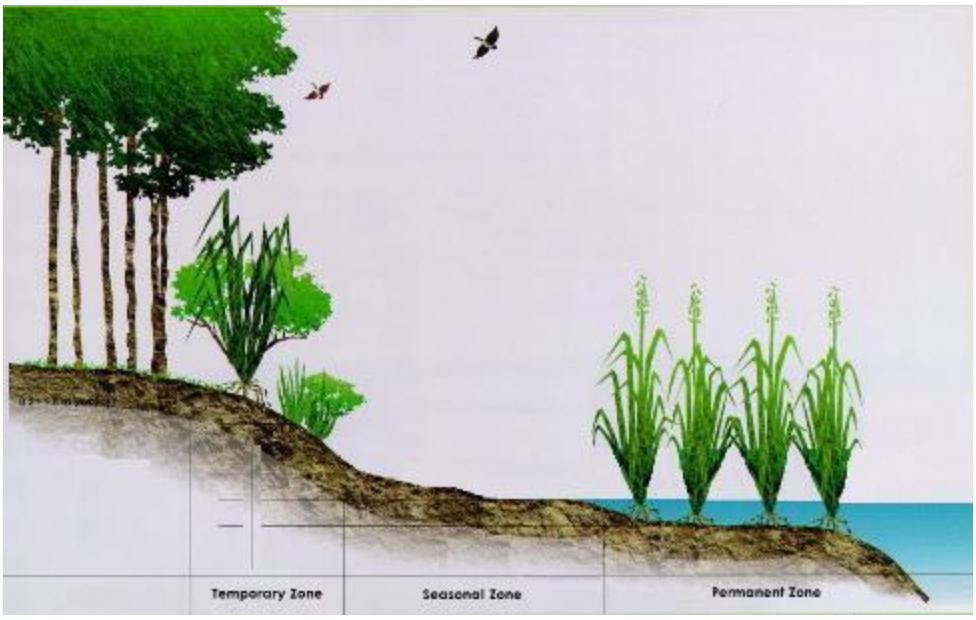

Figure 2: Increasing soil wetness zones.

Based on the definition of a wetland within the National Water Act, three vital concepts govern the presence of a wetland namely:

i. Hydrology- Land inundated by water or which displays saturated soils when these soils are biologically active (the growth season).
ii. Hydric soils- Soils that have been depleted of oxygen through reduction resulting in the presence of redoximorphic features.
iii. Hydrophytic vegetation- Plant species that are adapted to growing in saturated soils and subsequent anaerobic conditions (hydrophytes).

The conservation of wetland systems is vital as these habitats provide numerous functions that benefit not only biodiversity but provide an array of ecosystem services. These services are further divided into direct and indirect and are detailed in Table 1.

Table 1: Direct and indirect benefits of wetland systems (Kotze et al. 2005).

WETLANDS GOODS AND SERVICES	
DIRECT	**INDIRECT**
Hydrological Water purification Flood reduction Erosion control Groundwater discharge	Socio-economic Socio-cultural significance Tourism and recreation Education and research
Biodiversity conservation	Water supply
Chemical cycling	Provision of harvestable resources

The study site was assessed with regards to the determination of the presence of wetland areas according to the procedure described in “A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas” (DWAF, 2005).

4.2. WETLAND HEALTH AND FUNCTIONAL INTEGRITY ASSESSMENT TECHNIQUES

A level 2 Wet-Health Assessment was used to determine the Present Ecological State (PES); a Level 2 Wet-EcoServices Assessment, and an Ecological Importance and Sensitivity (EIS) assessment of the identified wetland was carried out. This was to understand if the wetland provides any ecological goods and services and/or contribute to conservation targets within the larger catchment.

4.3. ASSESSMENT OF IMPACT SIGNIFICANCE

Significance scoring both assesses and predicts the significance of environmental impacts through evaluation of the following factors; probability of the impact; duration of the impact; extent of the impact; and magnitude of the impact. The significance of environmental impacts is then assessed considering any proposed mitigations.

The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Each of the above impact factors have been used to assess each potential impact using ranking scales (see Table 2).

Table 2: Significance scoring used for each potential impact.

PROBABILITY	**DURATION**
1-very improbable 2-improbable 3-probable 4-high probable 5-definite	1- very short duration (0-1years) 2- short duration (2-5 years) 3- medium term (5-15 years) 4- long term (>15 years) 5- permanent/unknown
EXTEND	**MAGNITUDE**
1- Limited to the site 2- Limited to the local area 3-Limited to the region 4-National 5-International	2- minor 4- low 6-moderate 8-high 10-very high

The following formula was used to calculate impact significance: Impact Significance: (Magnitude + Duration + Extent) x Probability.

The formula gives a maximum value of 100 points which are translated into 1 of 3 impact significance categories; Low, Moderate and High as per Table 3.

Table 3: Impact significance ratings.

SIGNIFICANCE POINTS	SIGNIFICANCE RATING
0 - 30 points	Low environmental significance
31 - 59 points	Moderate environmental significance
60 -100 points	High environmental significance

5. DESCRIPTION OF THE STUDY AREA

The area has been exposed to high levels of disturbance, mainly by historical and current farming activities. There are very few patches of natural vegetation remaining.

Figure 3: Lucerne farming near the wetland on the Southern side of the project area.

Figure 4: View of the wetland on the Southern side of the project area (Kassalspruit).

5.1.1. Climate

The climate is warm and temperate. In winter, there is much less rainfall than in summer. The average annual temperature around the area is 17.8 °C. In a year, the rainfall is 699 mm.

5.1.2. Vegetation

The natural vegetation types found in the area consist of Central Sandy Bushveld and Marikana Thornveld (Fig. 5). Due to anthropogenic activities within the proposed area, the natural vegetation has been transformed and there are few patches of intact vegetation remaining.

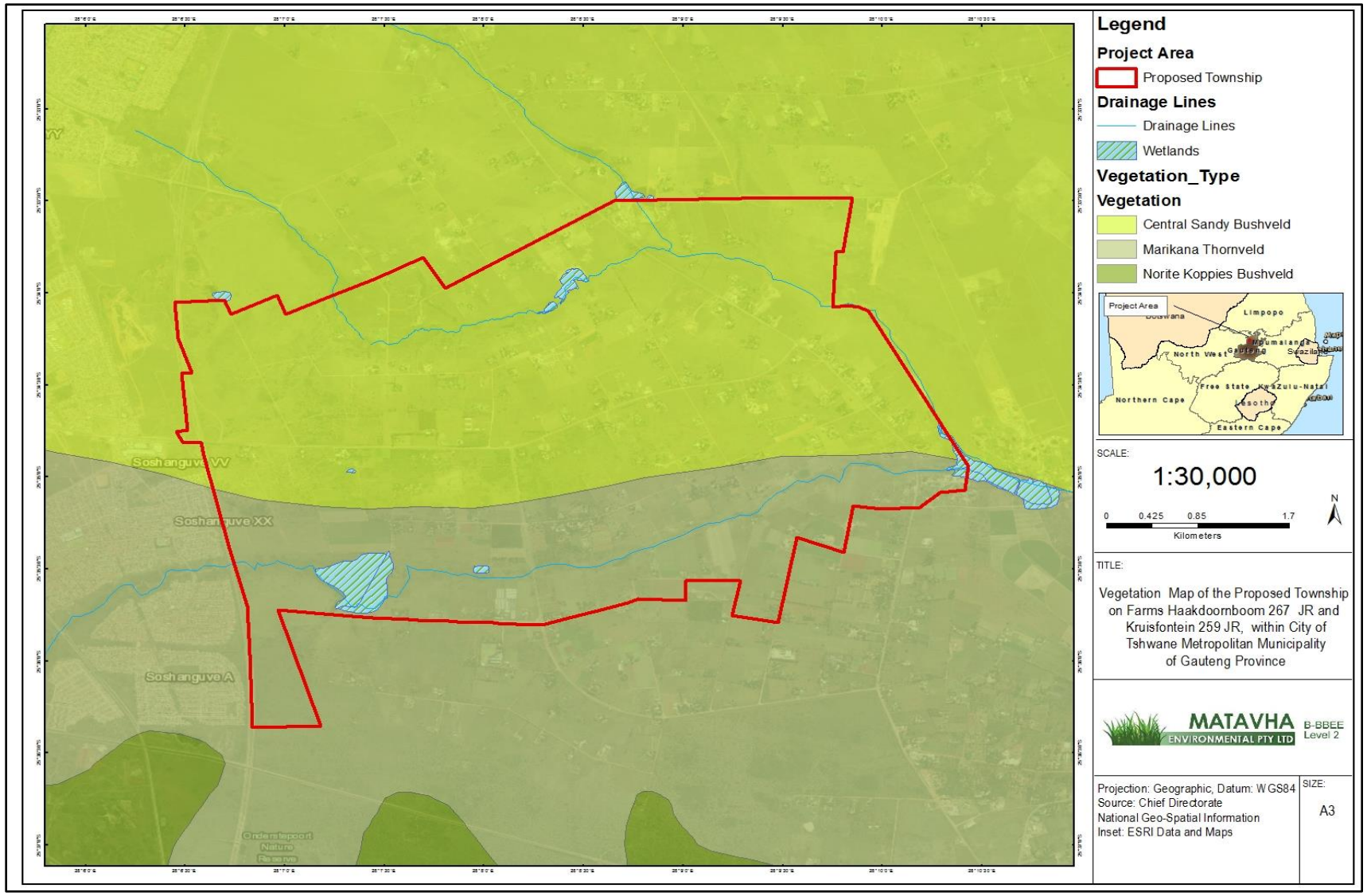

Figure 5: Vegetation map of the project area.

6. RELEVANT LEGISLATION

The Constitution of the Republic of South Africa Act (Act No. 108 of 1996) – Section 24.

The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights in which basic human rights are enshrined. Government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the National Water Act, the National Environmental Management Act, etc.

National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended.

NEMA replaces a number of the provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989). The Act provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration and implementation of the Act with regards to the protection and / or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4) specifies that "sustainable development requires the consideration of all relevant factors including aspects specifically relevant to biodiversity":

National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA).

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits rising from bio-prospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA.

National Water Act (Act No. 36 of 1998) (NWA).

The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

The National Water Act, requires any development to secure Water Use Licences with the following activities:

Section 21 (a), abstractive use of water for construction (if possible and required).

Section 21 (c) and (i) use, i.e. river or wetland crossings, which includes any drainage lines by any infrastructure.

In terms of the definitions provided, activities included under Sections 21(c) and 21(i) are (amongst others) the construction of roads, bridges, pipelines, culverts and structures for

slope stabilisation and erosion protection. DWS will however need to be approached to provide guidance on whether approval for Section 21 (c) and (i) water uses would be required.

GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NWA

According to the preamble to Part 6 of the NWA, “This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette…” “The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary…”

The General Authorisations for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA have recently been revised (Government Notice R509 of 2016). Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a General Authorisations (GA).

CMS

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned 22 with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include 117 (as of 1 June 2012) Parties from Africa, Central and South America, Asia, Europe and Oceania. South Africa is a signatory to this convention.

AEWA

The African-Eurasian Waterbird Agreement. The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is the largest of its kind developed so far under the CMS. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, terns, tropic birds, auks, frigate birds and even the South African penguin. The agreement covers 119 countries and the European Union (EU) from Europe, parts of Asia and Canada, the Middle East and Africa.

Other Relevant Legislations and Guidelines:

- DWS Wetlands Delineation and Riparian area determination Guideline, 2005;
- Biodiversity management plans (BMP);
- National biodiversity assessment (NBA); and
- Integrated Development Plan (IDP).

7. WETLAND ASSESSMENT FOR THE STUDY AREA

The purpose of the wetland assessment is to determine the relative importance, sensitivity, and current conditions of the significant aquatic features in order to assess the impact of the proposed residential township development on those aquatic resources. The assessment is also required to make recommendations in terms of mitigation measures that can be used to prevent or minimise the impact on the aquatic resources.

7.1. CLASSIFICATION OF WETLANDS

Wetlands are known to perform several important functions within ecosystems. These include flood attenuation, sediment trapping, improving water quality and being areas of rich biodiversity. However, most of the wetlands are disturbed and lost due to numerous natural disasters, human associated alteration and destruction and climate change effects both locally and globally.

It is important to note that, should one of these wetland functions be greatly affected, this does not necessarily mean that all the wetland functions are affected, but other functions can still be intact. For example, should the flood attenuation function of a wetland be greatly reduced through the cutting of vegetation across the site, this does not necessarily mean that the wetlands ability to purify water has also been lost. This obviously depends on the degree and nature of disturbance. Wetlands still maintain some degree of functionality regardless of the inflicted disturbance unless they are completely removed for infrastructure development.

Pressures arising from social and economic needs have resulted in widespread degradation of freshwater ecosystems. National Freshwater Ecosystem Priority Areas (NFEPA) aims to provide strategic spatial priorities for conserving South African freshwater ecosystems and support sustainable use of water resources. Therefore, implementing both the NWA and the RAMSAR Convention definition of wetland they map and prioritize these areas based on the criteria which look at their modification or alteration and ecosystem functionality. Under the NFEPA the assessed wetlands are categorized as natural or artificial and each wetland significance to the ecosystem functioning.

The wetland assessment consists of the following aspects: Wetland classification; Wetland integrity; and Ecosystem services supplied by the wetland.

The classification of the wetlands in the study area into different wetland types was based on the WET-EcoServices technique (Kotze et al, 2005). The WET-EcoServices technique identifies seven main types of wetland based on hydro-geomorphic characteristics (Table 4).

The table (Table 4) below defines the wetland types as seen in (Fig. 6) as classified by Rand Water, 2011 and defined by Kotze et al., 2007 and Ollis et al, 2013.

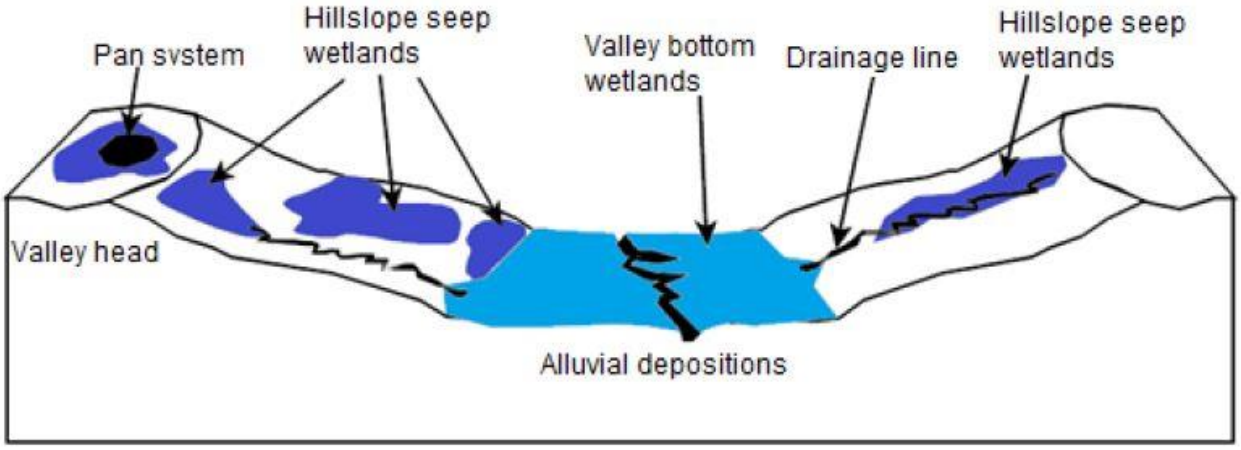

Figure 6: Wetland types as classified by Kotze et al, 2007 and Ollis et al, 2013.

Table 4: Wetland hydro-geomorphic types typically supporting inland wetlands in South Africa.

Hydro-geomorphic types	Description	Source of water maintaining the wetland[1]	
		Surface	Sub-surface
Floodplain	Valley bottom areas with a well-defined stream channel, gently sloped & characterized by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*
Valley bottom with a channel	Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*/***
Valley bottom without a channel	Valley bottom areas with no clearly defined stream channel usually gently sloped and characterized by alluvial sediment deposition, generally leading to accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.	***	*/***
Hillslope seep with stream channel	Slopes on hillsides, which are characterized by colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.	*	***
Isolated hillslope seepage	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***

Depression (includes pans)	A basin shaped area with a closed elevation contour that allows for accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.	*/***	*/***

[1] Precipitation is an important water source and evapotranspiration an important output

Water source: * Contribution usually small

** Contribution usually large

*** Contribution may be small or important depending on local circumstances

According to Table 4 the wetland features within the study area can be classified as follows:

Name	Depression
Quaternary catchment	A23E
Water Management Area	CROCODILE (WEST) AND MARICO
System	Inland
Ecoregion	Central Bushveld Group
Landscape setting	Flat
Seasonality	Perennial
Anthropogenic influence	Major disturbances due to surrounding activities (farming and settlements)
Vegetation	Primarily within Marikana Thornveld

7.2. WETLAND INTEGRITY

The Present Ecological Status (PES) Method (DWAF 2005) was used to establish the integrity of the wetlands/pans in the study area and was based on the modified Habitat Integrity approach developed by Kleynhans (DWAF, 1999; Dickens et al, 2003). Table 5 shows the criteria and results from the assessment of the habitat integrity of the wetlands.

Table 5: Habitat integrity assessment criteria for palustrine wetlands (Dickens et al, 2003).

Criteria & Attributes	Relevance
Hydrologic	
Flow Modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.
Permanent Inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.
Water Quality	
Water Quality Modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.
Sediment Load Modification	Reduction due to entrapment by dams or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.
Hydraulic/Geomorphic	
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities that reduce or change wetland habitat directly in inundation patterns.
Biota	
Terrestrial Encroachment	Desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.

Indigenous Vegetation Removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.
Invasive Plant Encroachment	Affects habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).
Alien Fauna	Presence of alien fauna affecting faunal community structure.
Over use of Biota	Overgrazing, over fishing, etc.

Table 6: Relation between scores given and ecological categories

Scoring Guidelines	Interpretation of Mean* of Scores: Rating of Present Ecological Status Category (PESC)
Natural, unmodified - score=5	Within general acceptable range. CATEGORY A >4; Unmodified or approximates natural condition.
Largely natural - score=4	CATEGORY B >3 and <4; Largely natural with few modifications, but with some loss of natural habitats
Moderately modifiedscore=3.	CATEGORY C >2 and <3; moderately modified, but with some loss of natural habitats.
Largely modified - score=2.	CATEGORY D <2; largely modified. Large loss of natural habitat & basic ecosystem function has occurred. OUTSIDE GENERALLY ACCEPTABLE RANGE
Seriously modified - rating=1	CATEGORY E >0 and <2; seriously modified. Losses of natural habitat & ecosystem function are extensive.
Critically modified - rating=0.	CLASS F 0; critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.

8. ASSESSMENT RESULTS FROM DELINEATED WETLANDS

8.1. SOIL WETNESS AND SOIL FORM INDICATOR

Soil samples were taken within the development footprint and examined for the presence of hydric (wetland) characteristics. Hydric soils are defined as those that typically show characteristics (redoximorphic features) resulting from prolonged and repeated saturation. Redoximorphic features include the presence of mottling (i.e. bright insoluble iron compounds); a gleyed matrix; and/or Manganese-Iron (Mn/Fe) concretions. The presence of redoximorphic features are the most important indicator of wetland occurrence, as these soil wetness indicators remain in wetland soils, even if they are degraded or desiccated (DWAF, 2005). It is important to note that the presence or absence of redoximorphic features within the upper 500mm of the soil profile alone is sufficient to identify the soil as being hydric, or non-hydric (Collins, 2005). Hydric properties were observed on the soil samples taken along the wetland. The soils displayed permanent inundation (Fig. 7).

Figure 7: Soil samples from the wetland.

8.2. VEGETATION INDICATOR

According to DWAF (2005), vegetation is regarded as a key component to be used in the delineation procedure for wetlands. Vegetation also forms a central part of the wetland definition in the National Water Act (Act 36 of 1998). Hydrophytic vegetation are plant species that are adapted to being permanently or temporarily waterlogged conditions (elevated water conditions in wetland soils). These wetland “indicator” species assist in the identification of wetland systems and associated boundaries. However, using vegetation as a primary wetland indicator requires undisturbed conditions (DWAF, 2005); wetland vegetation was made up of typical wetland species and alien invasive species.

8.3. TERRAIN INDICATOR

The topography of an area is generally a good practical indicator for identifying those parts in the landscape where wetlands are likely to occur. Generally, wetlands occur as a valley bottom unit however wetlands can also occur on steep to mid slopes where groundwater discharge is taking place through seeps (DWAF, 2005). In order to classify a wetland system, the localised landscape setting must be taken into consideration through ground-truthing of the study site after initial desktop investigations (Ollis et al., 2014).

The proposed development sits on a generally flat area, with few slopes towards the south western direction of the site. As a result, the only prominent wetland on site is a channeled valley-bottom with a flow.

8.4. PRESENT ECOLOGICAL STATUS (PES)

The wetland was assessed in terms of its health and it was found to have undergone moderate modifications (Table 7).

Table 7: Summary of impact scores

CHANNELLED VALLEY-BOTTOM WITH A FLOW	HYDROLOGY	GEOMORPHOLOGY	VEGETATION
Area weighted Impact Scores	1.8	0.0	5.0
PES Category	B	A	D
OVERALL IMPACT SCORES	2.2		
PES SCORE	C (Moderately Modified)		

8.5. ECOSYSTEM SERVICES PROVIDED BY THE WETLAND

The assessment of the ecosystem services supplied by the wetland was conducted according to the guidelines as described by Kotze *et* al (2005). An assessment was undertaken that examines and rates the services listed in Table 8. The characteristics were scored according to the general levels of services provided. It is important to ensure that natural wetland areas can continue to provide the valued goods and services.

Table 8: Goods and services assessment results for Kassalspruit wetland (high=4; low=0)

GOODS AND SERVICES	WETLAND
Flood attenuation	2.0
Stream flow regulation	1.8
Sediment trapping	1.8
Phosphate trapping	1.8
Nitrate removal	2.0
Toxicant removal	2.0
Erosion control	2.0
Carbon storage	2.0
Maintenance of biodiversity	3.0
Water supply for human use	2.2
Natural resources	2.5
Cultivated foods	2.8

Cultural significance	0.8
Tourism and recreation	1.5
Education and research	1.8

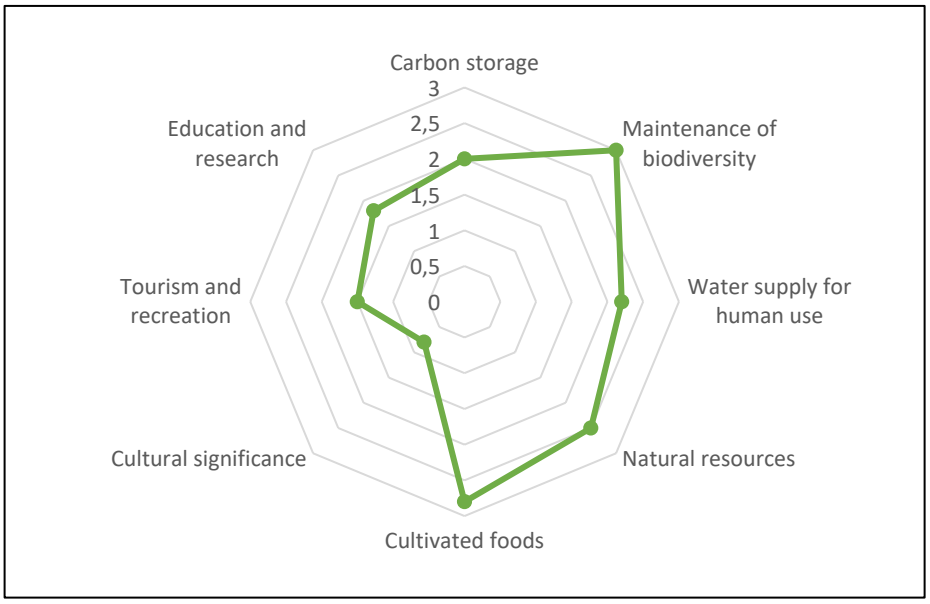

Figure 8: General WET-EcoServices results for the Kassalspruit wetland.

8.6. ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The Ecological Importance and Sensitivity of the wetland has been recorded as being moderate (Table 9). The wetland provides a moderate ecological support within the larger landscape.

Table 9: Summary of the Ecological Importance and Sensitivity

EIS	1.3
Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers	>1 and <=2

9. DELINEATED WETLANDS AND CONSTRAINTS MAP

Although the NFEPA database recognizes several wetlands within the study area, ground truthing revealed that there is one major prominent Channelled Valley-bottom wetland (Kassalspruit) located south west of the study area. The other wetlands are artificial (irrigation dams and swimming pools), while other wetlands are located outside the boundary of the study area. A buffer of 30 m was applied to all wetlands identified and a 32 m buffer was applied to the drainage lines (Fig. 9). Although these impoundments are not natural, they now provide refuge to resident, vagrant and migratory species. As a result, these watercourses, wetlands and ponds warrants protection. Furthermore, the drainages around the study site are part of the Apies River system. Ecological sensitivity map has been developed in order to guide the developer during the phase of the proposed project (Fig. 10). These impoundments for irrigation dams and livestock along the watercourses have resulted in erosion along the watercourses. Figures 11-12 show some of the modifications.

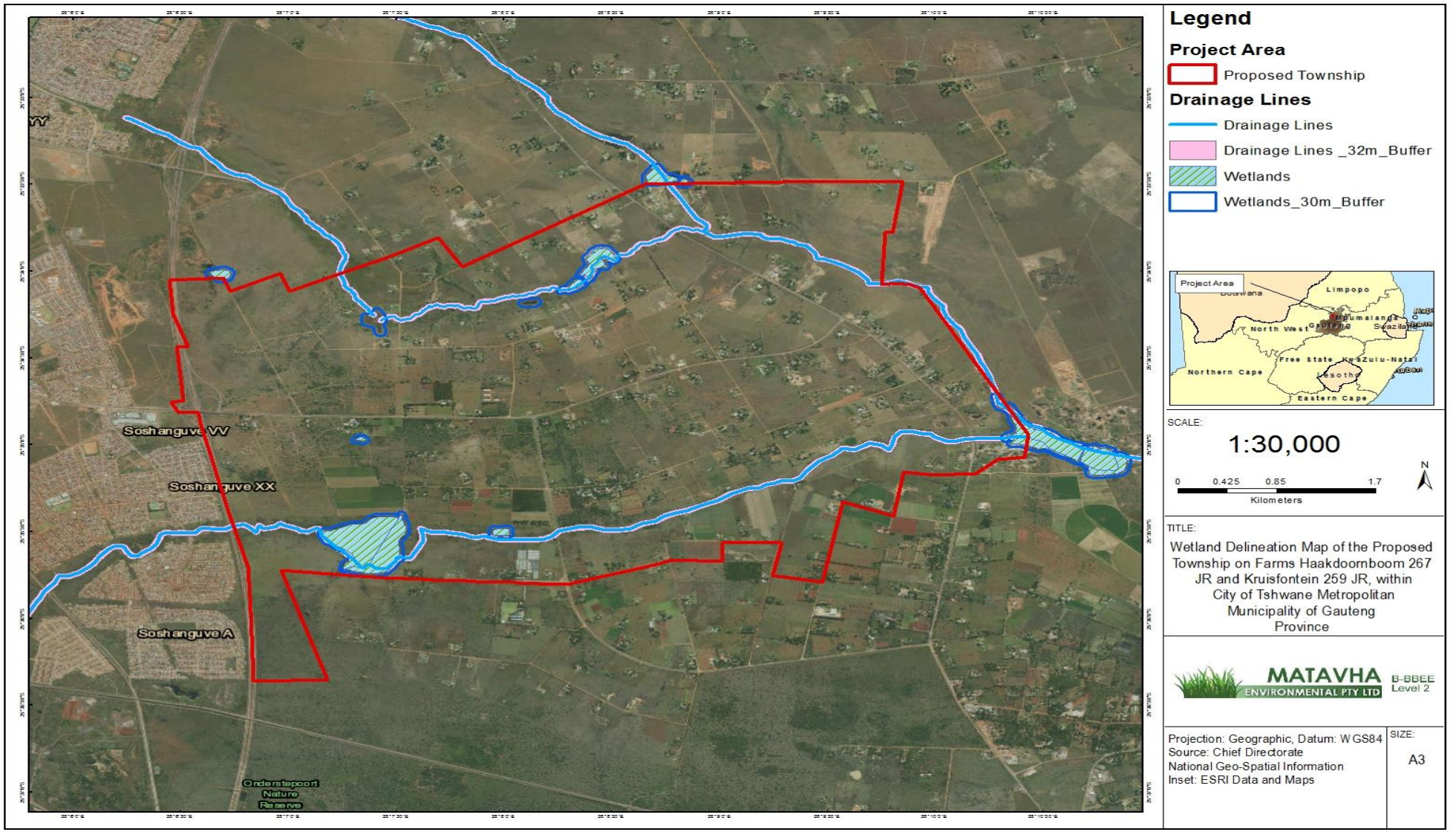

Figure 9: Delineated wetlands within and around the proposed township development site.

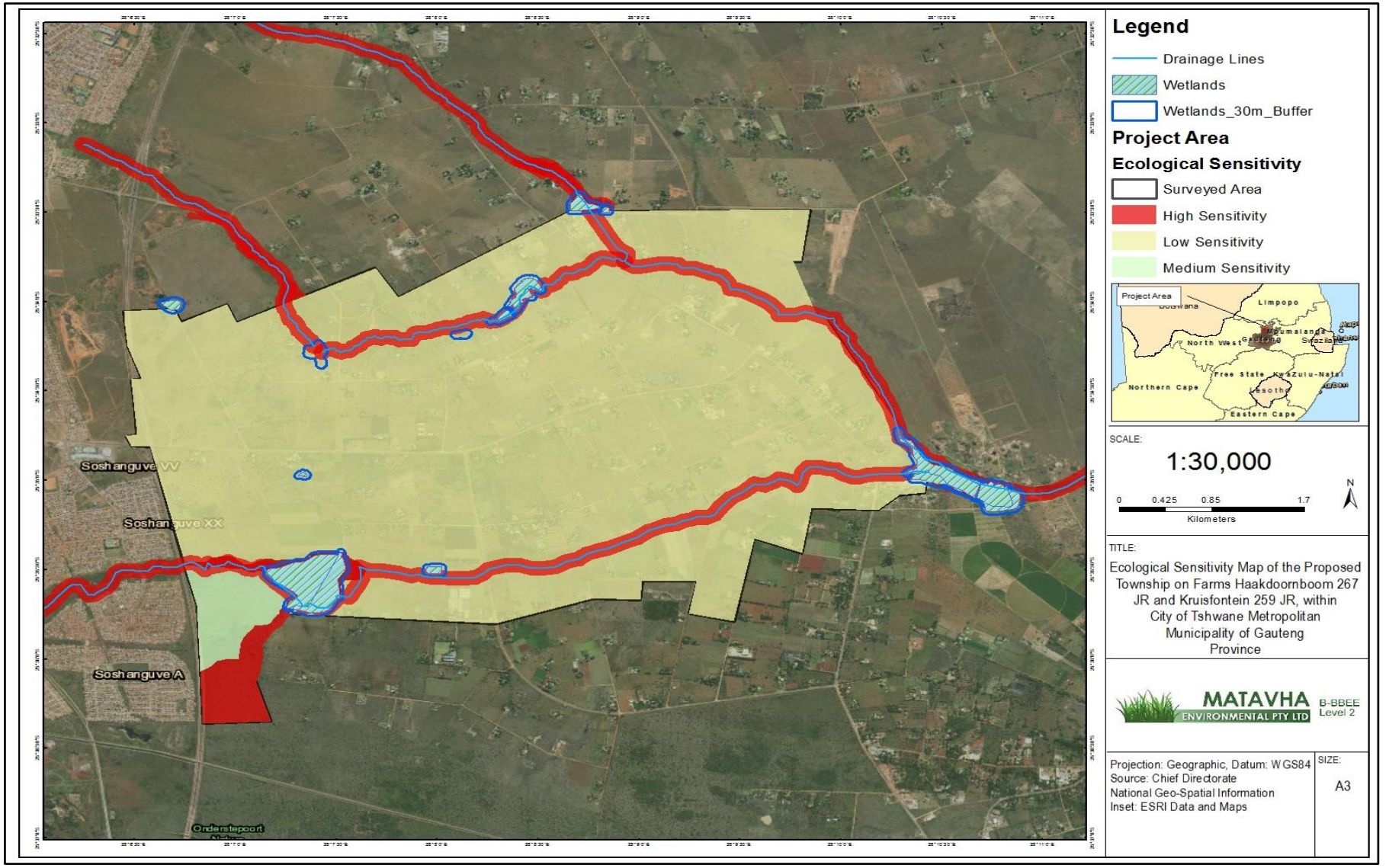

Figure 10: Ecological site sensitivity of the proposed township development site.

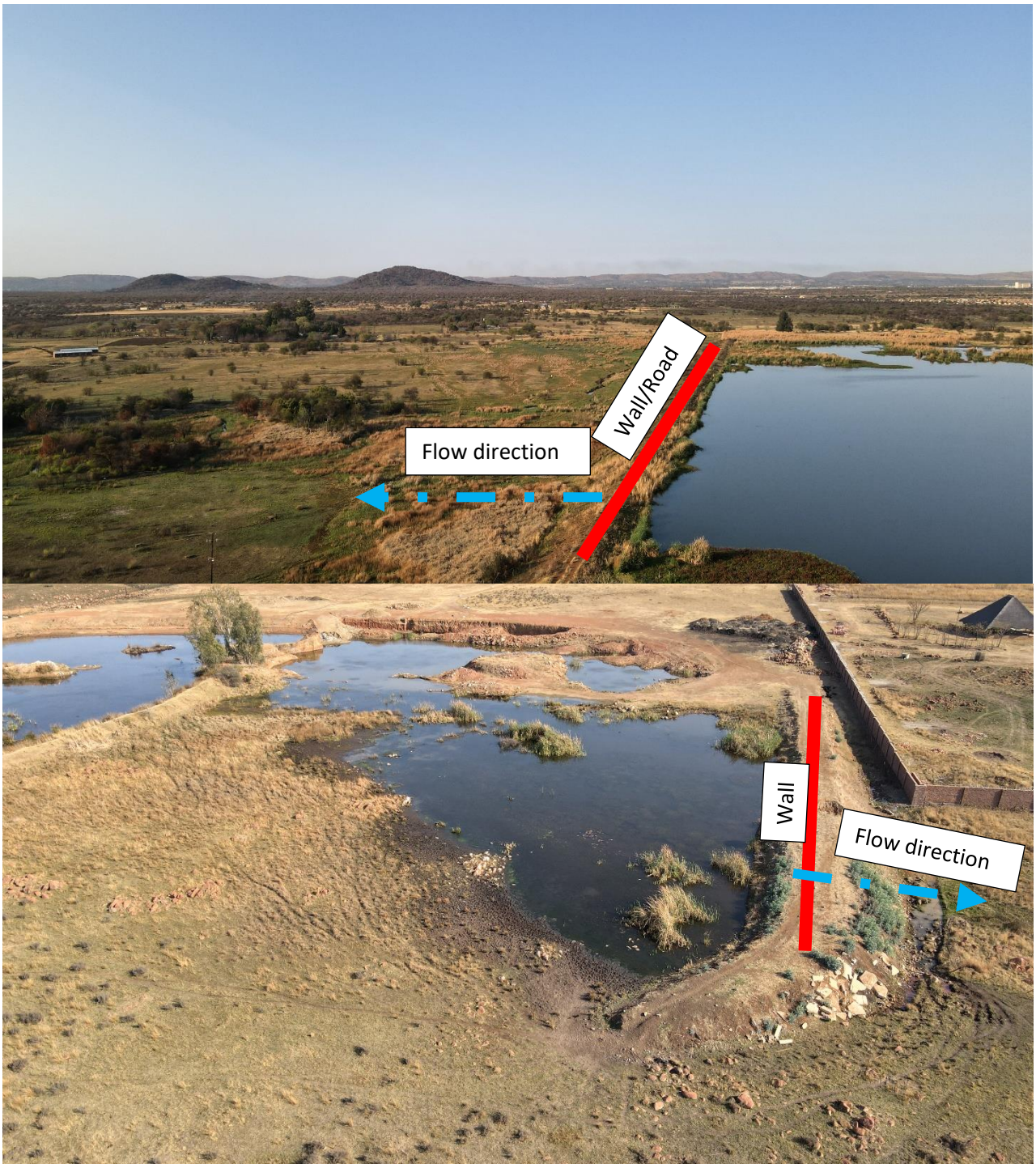

Figure 11: Typical watercourse modification within the proposed township development site.


Figure 12: Diggings on the watercourse on the northern part of the site.

10. IMPACT DESCRIPTION, ASSESSMENT AND MITIGATION

Any development activity in a natural system will have an impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify and assess the significance of the potential impacts caused by the proposed construction of the residential development on the surrounding waterbodies and to provide a description of the mitigation required so as to limit the identified negative impacts on the receiving environment.

The impact assessment identified the following negative impacts associated with the proposed development.

(i) Soil erosion and sedimentation of the watercourse system; and
(ii) Pollution as a result of runoff from the construction area entering into the waterbodies.

10.1. Soil erosion, sedimentation and degradation

Impacts associated with soil erosion and sedimentation										
Potential impact	Probability		Duration		Extent		Magnitude		Significance scoring without mitigation	Significance scoring with mitigation
	Without	With	Without	With	Without	With	Without	With		
Construction Phase										
Soil erosion and sedimentation	5	4	2	2	2	1	8	4	60 (High)	28 (Low)
Operational Phase										
Degradation of waterbodies	3	2	5	5	2	1	8	6	45 (Moderate)	24 (Low)

Description of impact

Construction activities (i.e. excavations and vegetation clearing) expose soil to environmental factors including rainfall and wind. The exposure to these factors will result in the removal of topsoil and the deposition of this sediment in the downslope watercourse system. This increased high-suspended particulate matter within the watercourse can accumulate particularly during the summer months leading to the sedimentation of this system. This poses a risk to the geomorphological/functional integrity of the water resource system, reducing its ecological integrity.

Mitigation Options

- Attenuation of stormwater from the development site is important to reduce the velocity of runoff into the wetland area.

- Attenuation measures during construction include but are not limited to – the use of sand bags, hessian sheets, silt fences, retention or replacement of vegetation and geotextiles such as soil cells which must be used in the protection of slopes.
- Long term attenuation measures are recommended in the design of the development and can include permeable paving; infiltration trenches or swales.

10.2. Pollution of waterbodies and soil

Impacts associated with soil erosion and sedimentation										
Potential impact	Probability		Duration		Extent		Magnitude		Significance scoring without mitigation	Significance scoring with mitigation
	Without	With	Without	With	Without	With	Without	With		
Construction Phase										
Pollution of waterbodies and soil	4	3	2	2	2	1	8	6	48 (Moderate)	28 (Low)
Operational Phase										
Pollution of waterbodies and soil	3	2	5	5	2	1	6	4	39 (Moderate)	24 (Low)

Description of the impact

Sediment release from construction site into the aquatic environment is one of the most common forms of waterborne pollution. Furthermore, mismanagement of waste and pollutants including hydrocarbons, construction waste and other hazardous chemicals will result in these substances entering and polluting the sensitive natural downstream environments either directly through surface runoff during rainfall events, or subsurface water movement.

Mitigation Options

- All waste generated during construction is to be disposed of as per an Environmental Management Programme (EMPr) and washing of containers, wheelbarrows, spades, picks or any other equipment that has been contaminated with cement or chemicals in the identified watercourses must be strictly prohibited.
- Proper management and disposal of construction waste must occur during the construction of the development.
- Waste disposal during the operational phase must ensure no litter or other contaminants on site are deposited in the downstream water resource environment.
- No release of any substance i.e. cement or oil, that could be toxic to fauna or faunal habitats within the watercourse.
- Servicing and refuelling of construction vehicles should take place outside of the sensitive (wetland and riparian)areas.

- Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed, and the affected area rehabilitated immediately.

11. RISK ASSESSMENT

The Risk Assessment for the proposed project as per the General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as defined in Section 21 (c) and (i) (Notice 509 of 2016) was undertaken.

The risk assessment involves the analysis of the risk matrix provided in Appendix A of this Notice and involves the evaluation of the severity of impacts to the flow regime, water quality, habitat, and biota of the water resource. Based on the outcome of the Risk Assessment Matrix, Low risk activities will be generally authorised with conditions, while Moderate to High risk activities will be required to go through a Water Use Licence Application Process. Water use activities that are authorised in terms of the General authorisations will still need to be registered with the Department of Water and Sanitation.

The risk assessment of the assessed Kassalspruit wetland is attached in the Appendix A. Potential impacts on the identified waterbodies received Low Risk Scores. The proposed township development will therefore not result in the net loss of natural wetlands within the catchment.

12. CONCLUSION AND RECOMMENDATIONS

The assessment revealed that there is only one prominent wetland within the study site and with strict adherence to the recommendations and mitigations, it will not be impacted by the development.

In terms of Section 39 of the National Water Act, the proposed township and associated activities will not impact any natural waterbodies as the riparian areas have been considered in the development layout, and no infrastructure should be located within the sensitive areas which are buffered such as drainage lines, wetlands and associated riparian areas. A General Authorization is recommended.

The Kassalspruit wetland is in a moderately modified state as a result of physical habitat modification and farming activities around it. Furthermore, the wetland provides limited goods and services as it is located on a private property. Rehabilitation along these watercourses is recommended, as it will improve the wetland functionality and stream flow.

The following are recommended for the proposed project:

- The contractor should ensure that no waste/litter from their activities reaches the wetland

- During construction, the wetland area should be fenced marked as a no-go area for labour force. This should follow the recommended 30 m buffer.
- During and after construction of the infrastructure, ensure effective storm water management around permanent infrastructure, rehabilitate disturbed areas using indigenous vegetation, and protect topsoil. This will reduce the possibility of soil erosion.
- Reseeding with indigenous grasses should be implemented in all affected areas around the natural wetland and on the proposed open spaces as per the layout. Strategic planting of grassland species should take place to re-establish microclimates and niche habitats.
- Proper toilet facilities must be located outside the sensitive areas; Chemical toilets must be provided which should always be well serviced and spaced as per occupational health and safety laws, construction regulations and placed outside the buffer.
- No construction personnel are allowed to collect, harvest or kill any species of fauna and flora on the site.
- Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction and operational phases.
- Informal fires should be prohibited during all development phases.

It is the opinion of the specialist that the proposed township be considered, provided that the mitigations and recommendations are adhered to.

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14. APPENDICES

APPENDIX A: RISK ASSESSMENT

Matrix assists DWS to determine where the proposed development triggers a Water Use License Authorization (WULA) or Water Use General Authorization (WUGA). The risk assessment is based on the Department of Water and Sanitation 2015 publication: Section 21 c and i water use Risk Assessment Protocol in Government Gazette no. 40229 dated 26 August 2016.

Name and Registration No. of SACNASP Professional member: Mokgatla Molepo, Reg No. 009509

Risk Assessment Matrix - Total Severity Score with Mitigation

No.	Phases	Activity	Aspect	Impact	Flow Regime		Physico & Chemical (Water Quality)		Habitat (Geomorph + Vegetation)		Biota
1	Construction phase	Construction of residential units	Infrastructure within 30 m of the wetland	Possible pollution and reduction of the wetland	**1**		**1**		**1**		**1**
2	Operational Phase	Maintenance of the development	Sediment deposition within the wetland	Soil compaction, erosion and sediment deposition	**2**		**2**		**1**		**1**

Risk Assessment Matrix – Final Risk Rating

No	Severity	Spatial scale	Duration		Consequence		Frequency of activity	Frequency of impact	Legal Issues	Detection		Likelihood	Significance	Risk Rating
1	**1**	**1**	**1**		**3**		**4**	**1**	**5**	**1**		**11**	**33**	LOW
2	**1.5**	**1**	**1**		**3.5**		**4**	**1**	**5**	**1**		**11**	**38.5**	LOW

Risk Assessment Matrix – Confidence Level and Proposed Post Control/Mitigation Measures

No	Risk Rating	Confidence level	Control Measures	Borderline LOW MODERATE Rating Classes	PES AND EIS OF WATERCOURSE
1	LOW	**80%**	All infrastructure must be outside the buffer of the wetland	N/A	The wetland is considered to be of very moderate ecological importance
2	LOW	**80%**	All infrastructure must be outside the buffer of the wetland	N/A	The wetland is considered to be of very moderate ecological importance

APPENDIX B: GLOSSARY OF ACRONYMS

BGIS Biodiversity Geographic Information System

CR Critically Endangered

DEA Department of Environmental Affairs

EIA Environmental Impact Assessment

EN Endangered

EW Extinct in the Wild

EA Environmental Authorization

EIS Ecological Important Services

ME Mitigation Efficiency

NBA National Biodiversity Assessment

NBSAP National Biodiversity Strategy and Action Plans

NEMBA National Environmental Management Biodiversity Act

NFEPA National Freshwater Ecosystem Priority Areas

NT Near Threatened

NWA National Water Act

PES Present Ecological State

QDS Quarter Degree Square

R Rare

RDL Red Data List

SANBI South African National Biodiversity Institute

SCC Species of Conservation Concern

ToR Terms of Reference

VU Vulnerable

WMA Water Management Areas